



FCC Radio TEST Report

FCC ID: YWOM-BM1DL

This report concerns (check one): Original Grant Class II Change

Issued Date : Feb. 03, 2012
Project No. : 1201C019
Equipment : 2.4G Wireless Laser Mouse
Model Name : M-BM1DL; M-BM1DLWH; M-BM1DLBK;
M-BM1DLGN; M-BM1DLPN; M-BM1DLYL;
M-BM1DLPU;13118;13119;13120;13121;13122;13123
Applicant : ELECOM CO.,LTD.
Address : OSAKA-MIDOUSUJI BLDG.1-1FUSHIMI-MACHI4-
CHOME CHUOKU, OSAKA,JAPAN.
Manufacturer : Sysgration(Shenzhen) Ltd.
Address : Egongling Village, Pinghu Town, Longgang Dist.
Shenzhen City. China

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Jan. 04, 2012
Date of Test:
Jan. 04, 2012 ~ Feb. 03, 2012

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Declaration

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For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



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1. CERTIFICATION

Equipment : 2.4G Wireless Laser Mouse

Brand Name : ELECOM

Model Name. : M-BM1DL; M-BM1DLWH; M-BM1DLBK; M-BM1DLGN; M-BM1DLPN;
M-BM1DLYL; M-BM1DLPU;13118;13119;13120;13121;13122;13123

Applicant : Sysgration Ltd.

Factory : Sysgration(Shenzhen) Ltd.

Address : Egongling Village, Pinghu Town, Longgang Dist. Shenzhen City. China

Date of Test : Jan. 04, 2012 ~ Feb. 03, 2012

Test Item : ENGINEERING SAMPLE

Standards : FCC Part15, Subpart C(15.249)/ ANSI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1201C019) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209	Radiated Emission	PASS	
15.249	Radiated Spurious Emission	PASS	

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) The EUT used new battery.



2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C03/DG-CB03** at the location of No.3, Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792
 Neutron's test firm number is 319330

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C03	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
DG-CB03	CISPR	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4G Wireless Laser Mouse	
Brand Name	ELECOM	
Model Name.	M-BM1DL; M-BM1DLWH; M-BM1DLBK; M-BM1DLGN; M-BM1DLPN; M-BM1DLYL; M-BM1DLPU; 13118;13119;13120;13121;13122;13123	
OEM Brand/Model Name	N/A	
Model Difference	Different is only the appearance color.	
Product Description	The EUT is a 2.4G Wireless Laser Mouse .	
	Product Type	Low Power Communication Device
	Operation Frequency:	2412~2472 MHz
	Modulation Type:	GFSK
	Date rate:	1Mbps
	Number Of Channel	5CH .Please see note 2.
	Antenna Designation:	Printed antenna
	Antenna Gain(Peak)	-1.24 dBi
	Output Power:	92.52dBuV/m (AV Max.)
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification. Please refer to the User's Manual.		
Power Source	1# DC Voltage supplied from Li-ion battery 2# DC Voltage supplied from Host System	
Power Rating	1# DC 3.7V 2# I/P AC 120V/60Hz O/P DC 5V	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412MHz	02	2427MHz
03	2452MHz	04	2467MHz
05	2472MHz		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed Antenna	N/A	-1.24



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH Lower - 2412MHz
Mode 2	CH Middle - 2452MHz
Mode 3	CH Highest -2472MHz
Mode 4	Charge Mode & Normal Link

For Conducted Test	
Final Test Mode	Description
Mode 4	Charge Mode & Normal Link

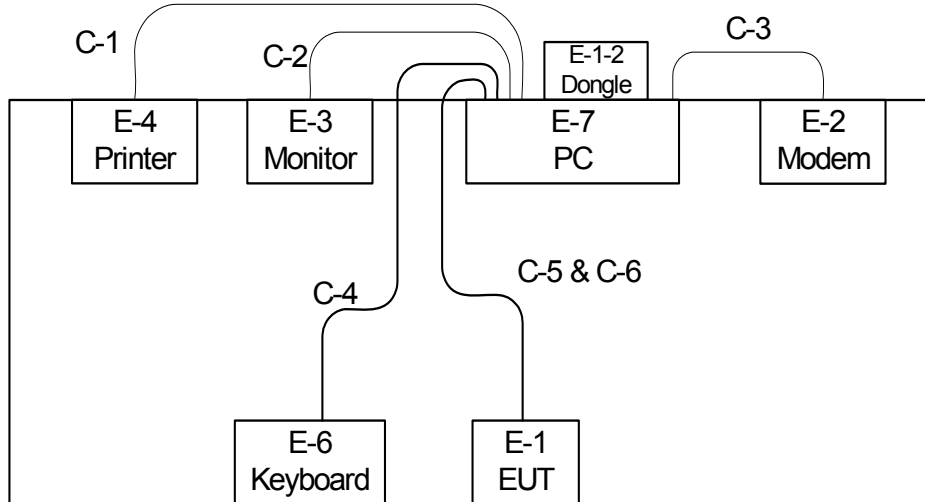
For Radiated Test	
Final Test Mode	Description
Mode 1	CH Lower - 2412MHz
Mode 2	CH Middle - 2452MHz
Mode 3	CH Highest -2472MHz

Note:

- (1) The EUT used the new battery

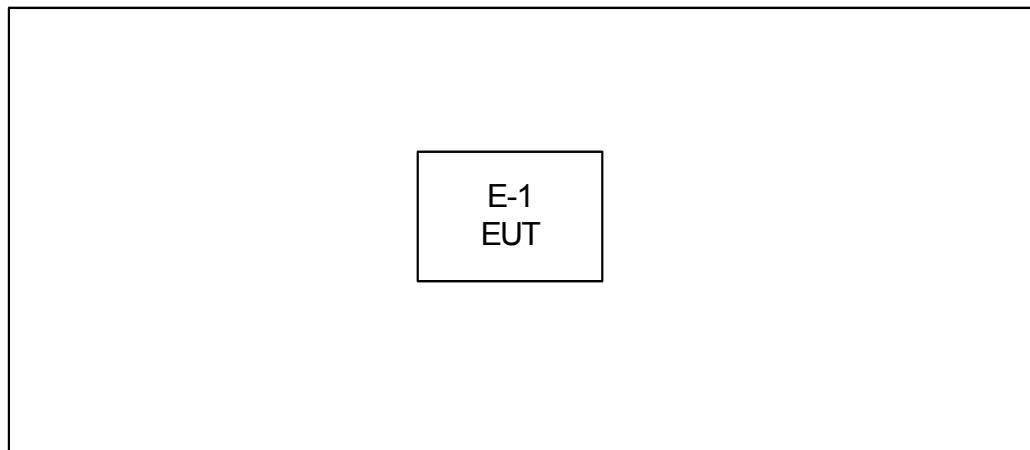
3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted:



- C-1: Parallel Cable
- C-2: D-Sub Cable
- C-3: RS232 Cable
- C-4: USB Cable
- C-5: USB Cable
- C-6: USB Cable

Radiated:





3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	2.4G Wireless Laser Mouse	ELECOM	M-BM1DL	YWOM-BM1DL	N/A	EUT
E-1-1	2.4G Wireless Dongle	ELECOM	(R)M-BM1DL	YWOM-BM1DL-R	N/A	
E-2	Modem	ACEEX	DM-1414V	IFAXDm1414	0603002131	
E-3	LCD monitor	Dell	E177FPc	DOC	CNOFJ179-64180-6AG-1WNS	
E-4	Printer	SII	DPU-414	DOC	3018507 B	
E-5	Modem	ACEEX	DM-1414V	IFAXDm1414	0603002131	
E-6	USB Keyboard	Dell	L100	DOC	CNORH6596589085C00U7	
E-7	PC	Dell 745	DCSM	DOC	G7K832X	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	YES	YES	1.8M	
C-2	YES	NO	1.5M	
C-3	YES	NO	1.5M	
C-4	YES	YES	1.8M	
C-5	YES	NO	1.2M	
C-6	NO	NO	0.85M	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in m in 『Length』 column.



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2SH	00052766	May.25.2012
2	LISN	R&S	ENV216	100526	May.25.2012
3	Test Cable	N/A	C_19	N/A	Apr.25.2012
4	EMI TEST RECEIVER	R&S	ESCI	100895	May.26.2012
5	50Ω Terminator	SHX	TF2-3G-A	08122901	May.26.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

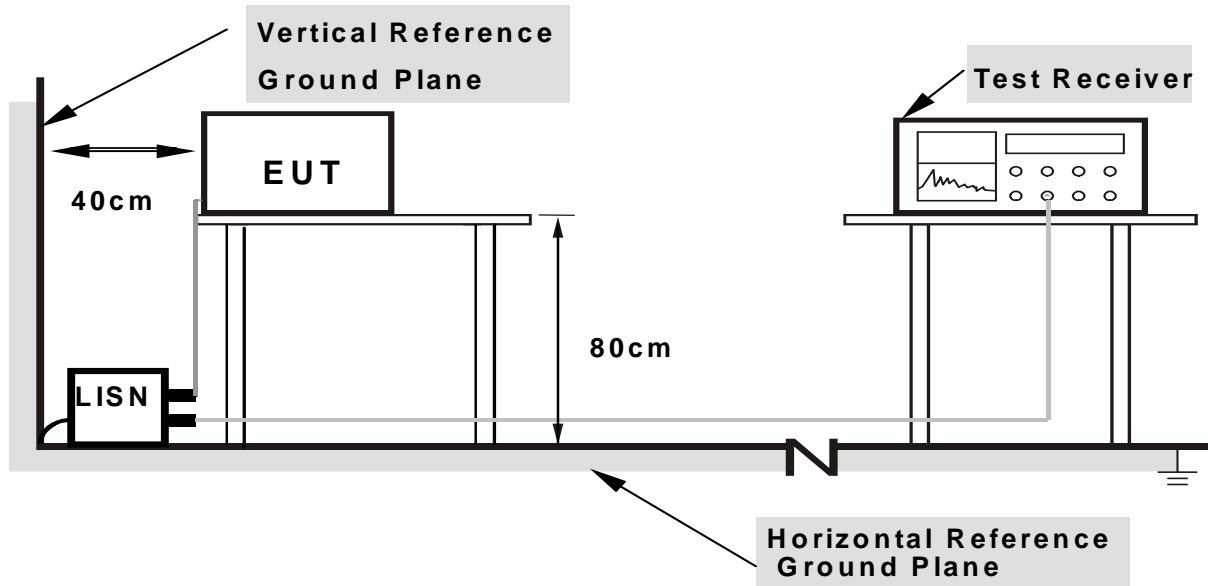
4.1.3 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



- Note: 1.Support units were connected to second LISN.**
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting mode.



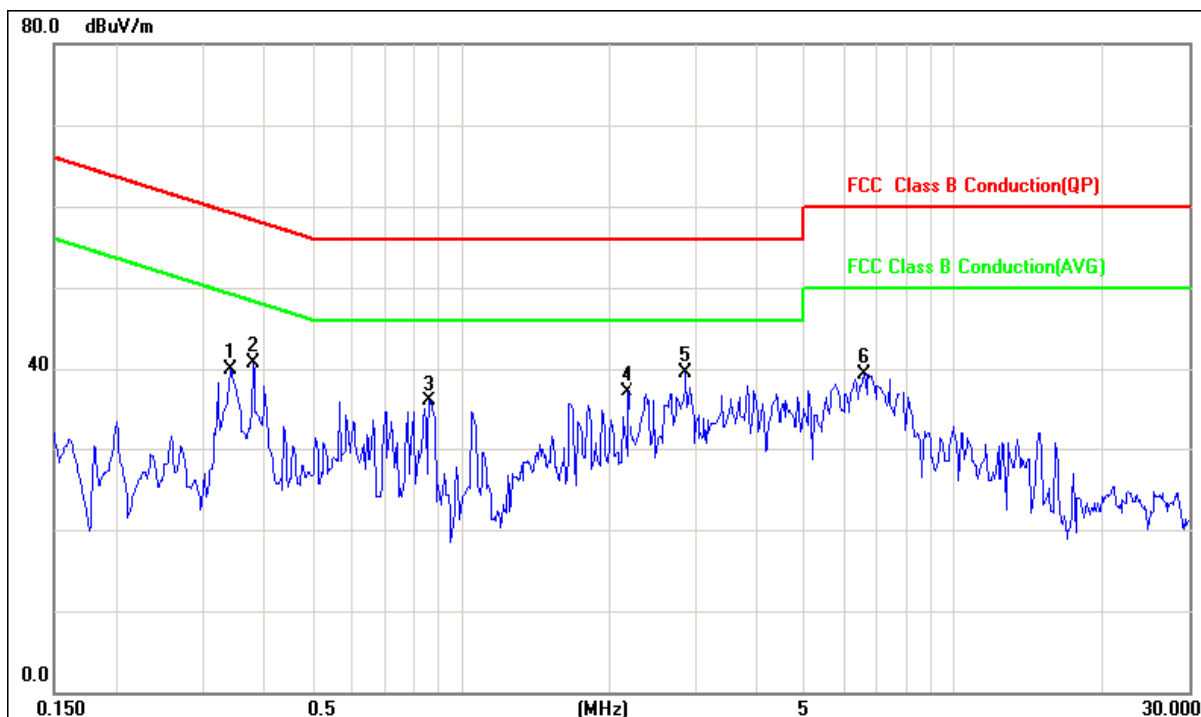
4.1.7 TEST RESULTS

EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	Charge Mode & Normal Link		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.341	Line	40.00	*	59.17	49.17	-19.17	(QP)
0.380	Line	40.65	*	58.27	48.27	-17.62	(QP)
0.865	Line	35.82	*	56.00	46.00	-20.18	(QP)
2.189	Line	37.05	*	56.00	46.00	-18.95	(QP)
2.877	Line	39.50	*	56.18	46.18	-16.68	(QP)
6.598	Line	39.29	*	60.00	50.00	-20.71	(QP)

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.



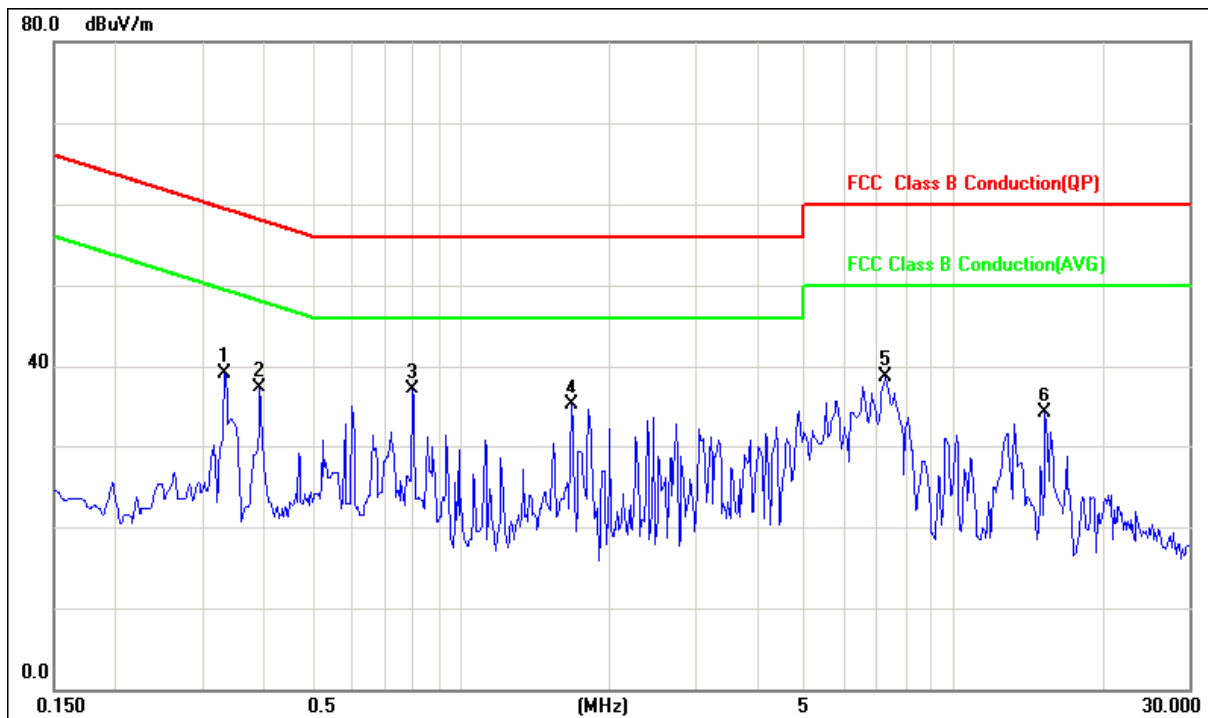


EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	Charge Mode & Normal Link		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.334	Neutral	39.18	*	59.36	49.36	-20.18	(QP)
0.392	Neutral	37.31	*	58.02	48.02	-20.71	(QP)
0.798	Neutral	37.13	*	56.00	46.00	-18.87	(QP)
1.673	Neutral	35.02	*	56.00	46.00	-20.98	(QP)
7.293	Neutral	38.72	*	60.00	50.00	-21.28	(QP)
15.324	Neutral	34.10	*	60.00	50.00	-25.90	(QP)

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

FCC Part15 (15.249) , Subpart C	
Limit	Frequency Range (MHz)
Field strength of fundamental 50000 μV/m (94 dBμV/m) @ 3 m	2400-2483.5
Field strength of harmonics 500 μV/m (54 dBμV/m) @ 3 m	Above 2483.5



4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Active Loop Antenna	R&S	HFH2-Z2	830749/020	May.26.2012
2	Bi-log Antenna	Schwarbeck	VULB9160	9160-3232	May.25.2012
3	Horn Antenna	ETS	3115	00075789	May.11.2012
4	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170340	Dec.14.2012
5	Amplifier	HP	8447D	2944A09673	May.25.2012
6	Amplifier	Agilent	8449B	3008A02274	May.25.2012
7	Amplifier	EMC	EMC2654045	980039	Aug.11.2012
8	Test Receiver	R&S	ESCI	100895	May.25.2012
9	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2012
10	Test Cable	N/A	C-01_CB03	N/A	May.04.2012
11	Test Cable	HUBER+SUHNER	SUCOFLEX_8m	313794/4	Apr.11.2012
12	Controller	CT	SC100	N/A	N/A

Remark: " N/A" denotes No Model Name. / Serial No. and No Calibration specified.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, Average=PK-dycty cycle

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



4.2.3 TEST PROCEDURE

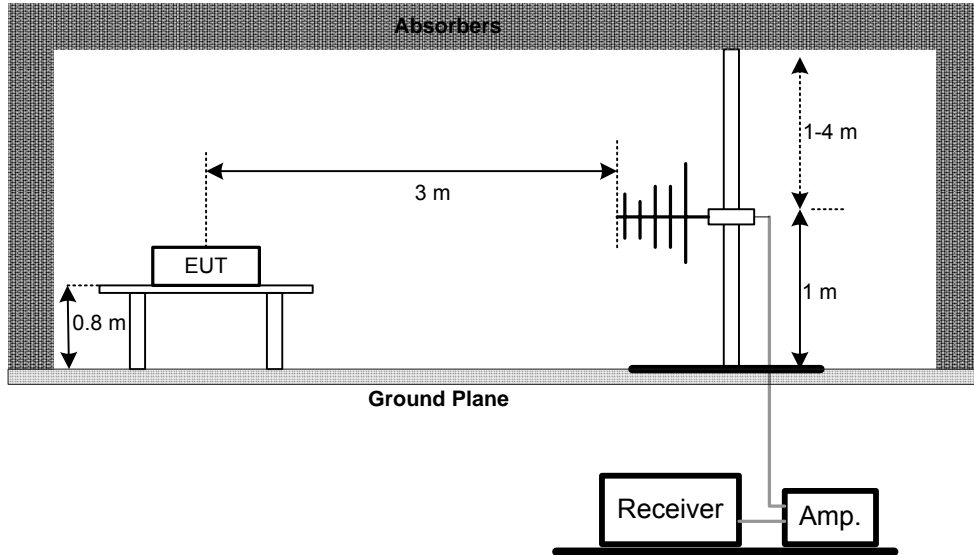
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.4 DEVIATION FROM TEST STANDARD

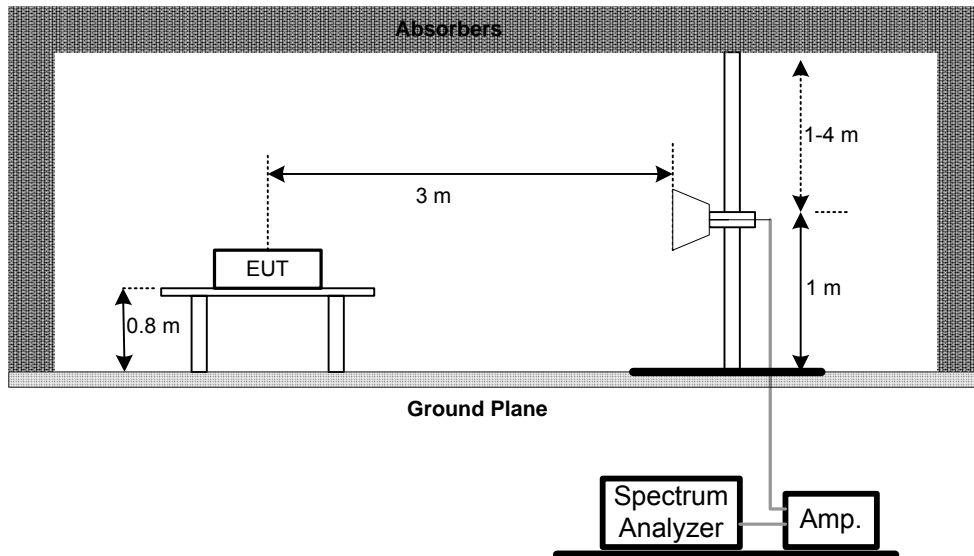
No deviation

4.2.5 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



4.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



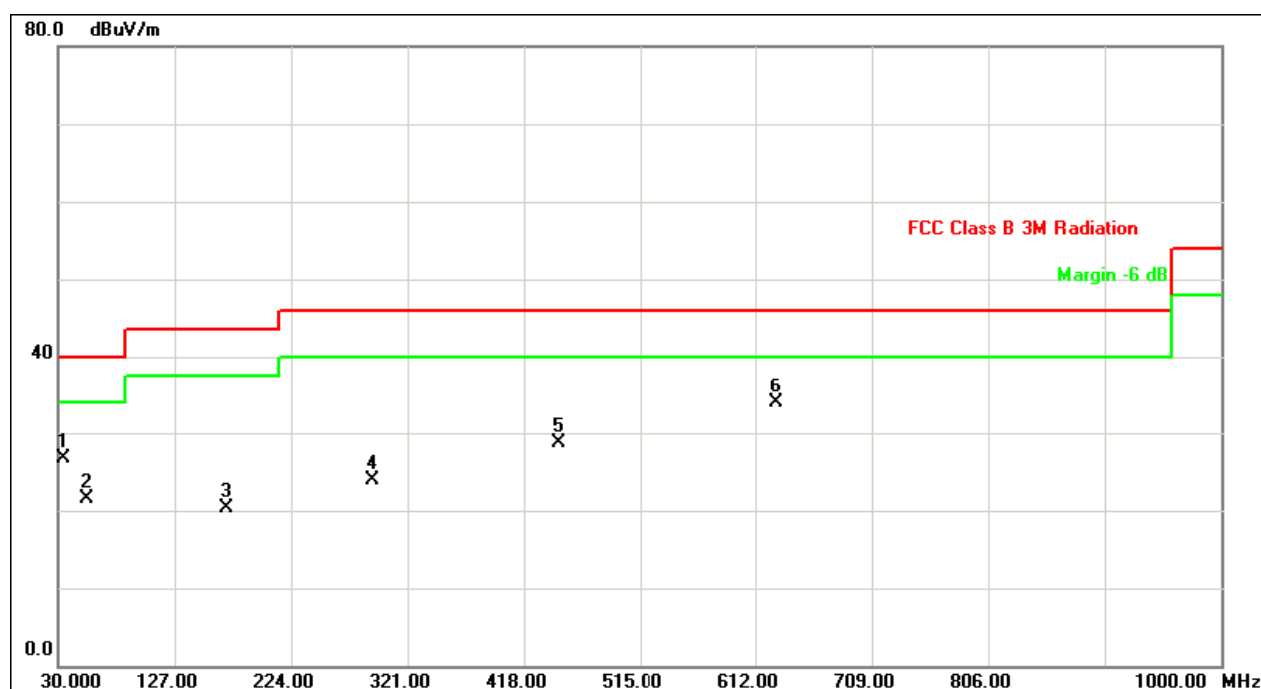
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHz)

EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	58 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2412MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
34.85	V	43.62	-16.90	26.72	40.00	- 13.28	
54.25	V	38.93	-17.52	21.41	40.00	- 18.59	
170.65	V	37.50	-17.27	20.23	43.50	- 23.27	
291.90	V	36.04	-12.06	23.98	46.00	- 22.02	
447.10	V	36.83	-8.17	28.66	46.00	- 17.34	
628.98	V	37.65	-3.73	33.92	46.00	- 12.08	

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ “F” denotes fundamental frequency; “ H” denotes spurious frequency. “E” denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



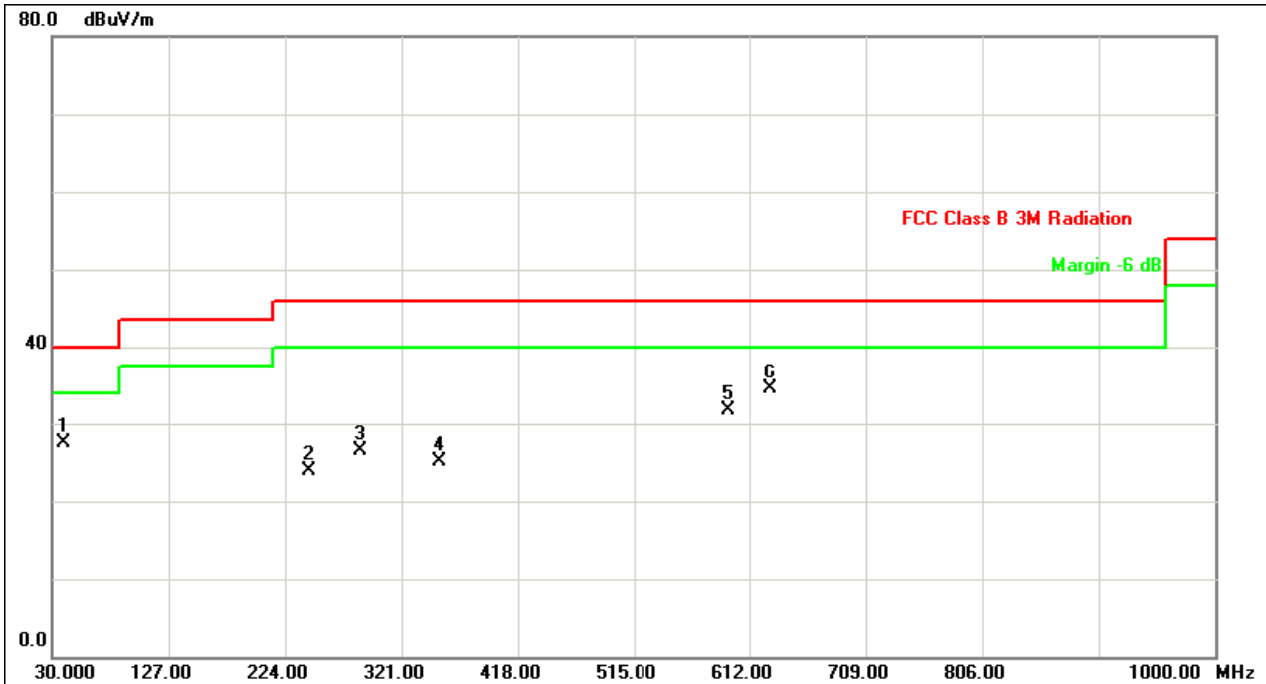


EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	58 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2412MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBUV)	Corr.Factor(CF) (dB)	Measured(FS) (dBUV/m)	Limits(QP) (dBUV/m)	Margin (dB)	Note
39.70	H	44.24	-16.83	27.41	40.00	- 12.59	
243.40	H	38.94	-14.97	23.97	46.00	- 22.03	
287.05	H	38.72	-12.23	26.49	46.00	- 19.51	
352.53	H	35.89	-10.75	25.14	46.00	- 20.86	
595.03	H	36.07	-4.39	31.68	46.00	- 14.32	
628.98	H	38.33	-3.73	34.60	46.00	- 11.40	

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ “F” denotes fundamental frequency; “ H” denotes spurious frequency. “E” denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.





4.2.8 TEST RESULTS (ABOVE 1000 MHz)

EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2412MHz		

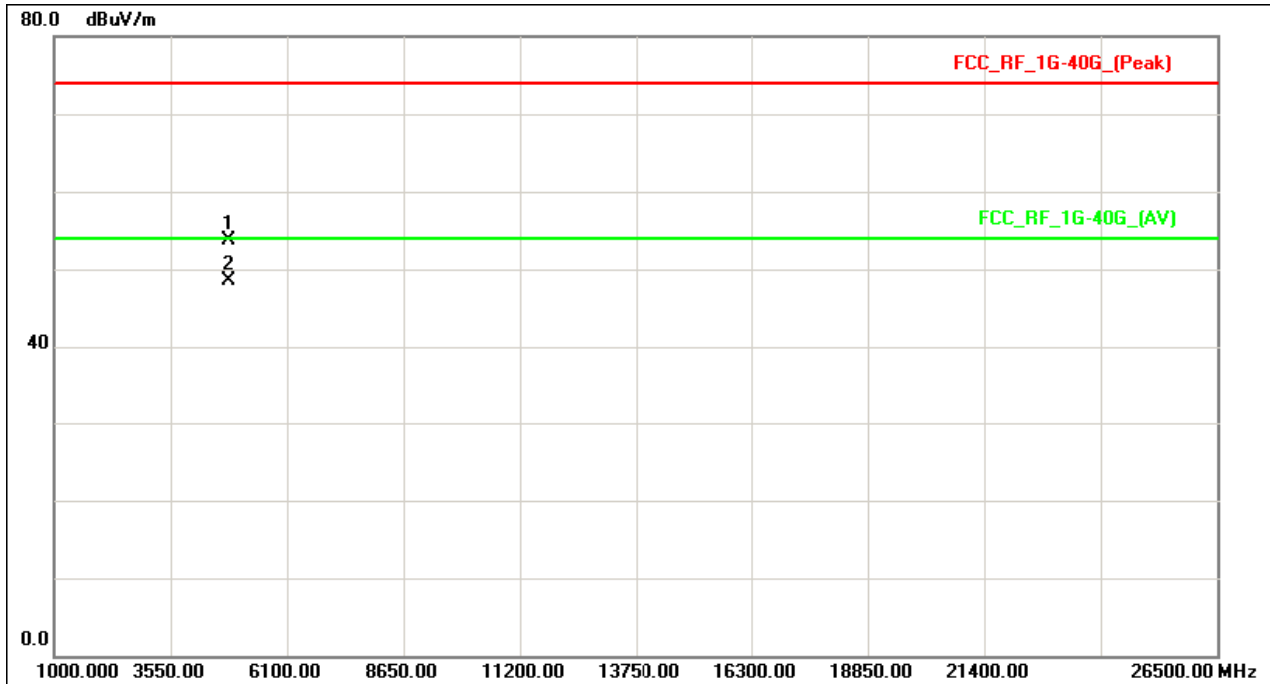
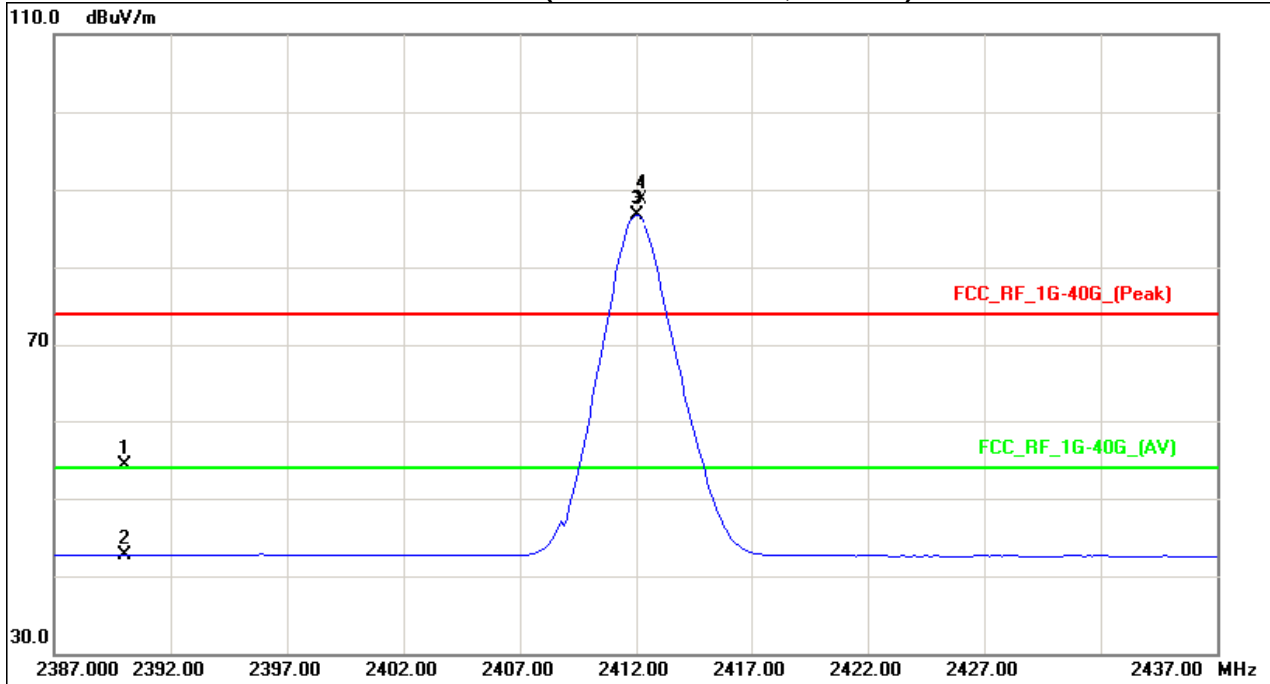
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	V	22.36	10.85	31.91	54.27	42.76	74.00	54.00	X/E
2412.25	V	56.79	54.78	31.89	88.68	86.67	114.00	94.00	X/F
4824.08	V	48.41	43.12	5.29	53.70	48.41	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2412MHz (Above 1000 MHz, Vertical)





EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2412MHz		

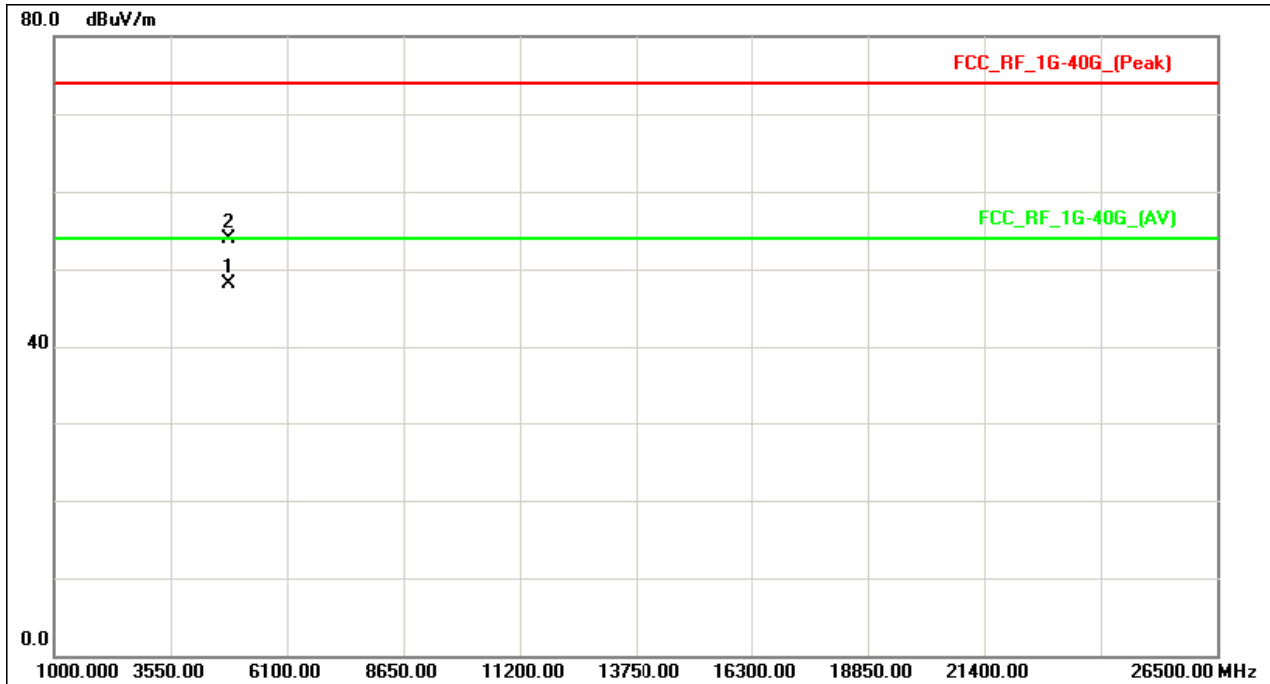
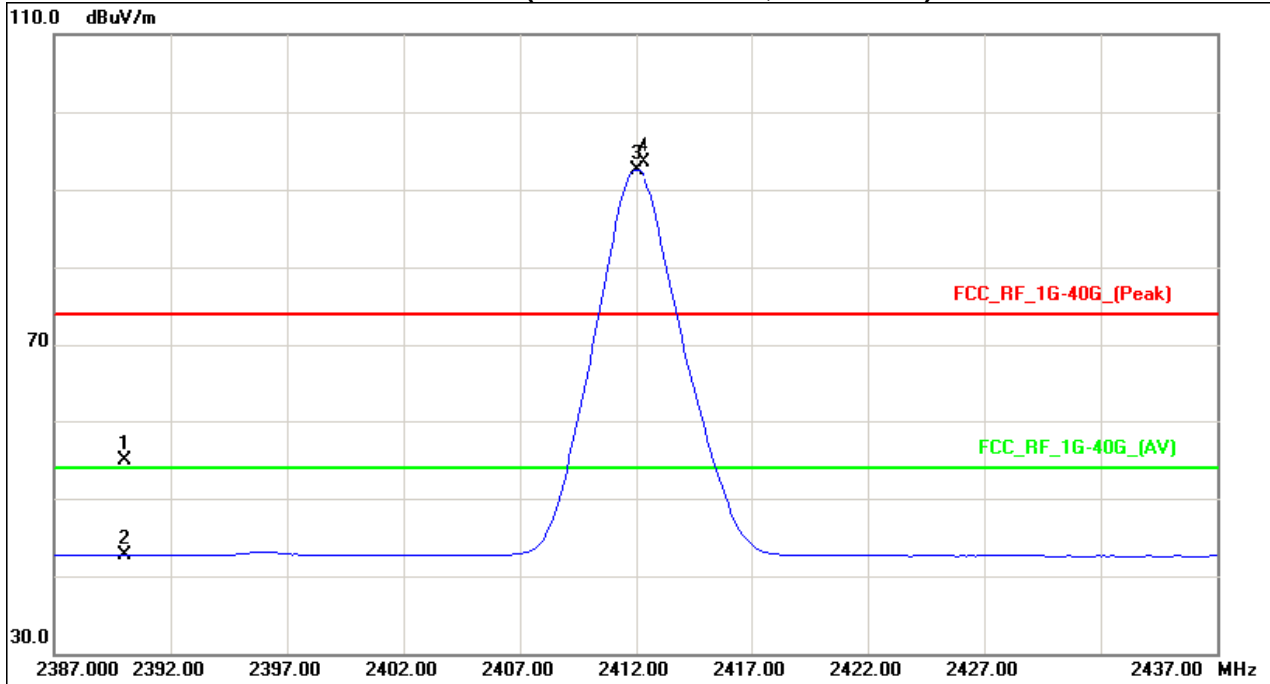
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	H	23.05	10.84	31.91	54.96	42.75	74.00	54.00	X/E
2412.38	H	61.63	60.63	31.89	93.52	92.52	114.00	94.00	X/F
4824.25	H	48.54	42.79	5.29	53.83	48.08	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2412MHz (Above 1000 MHz, Horizontal)





EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2452MHz		

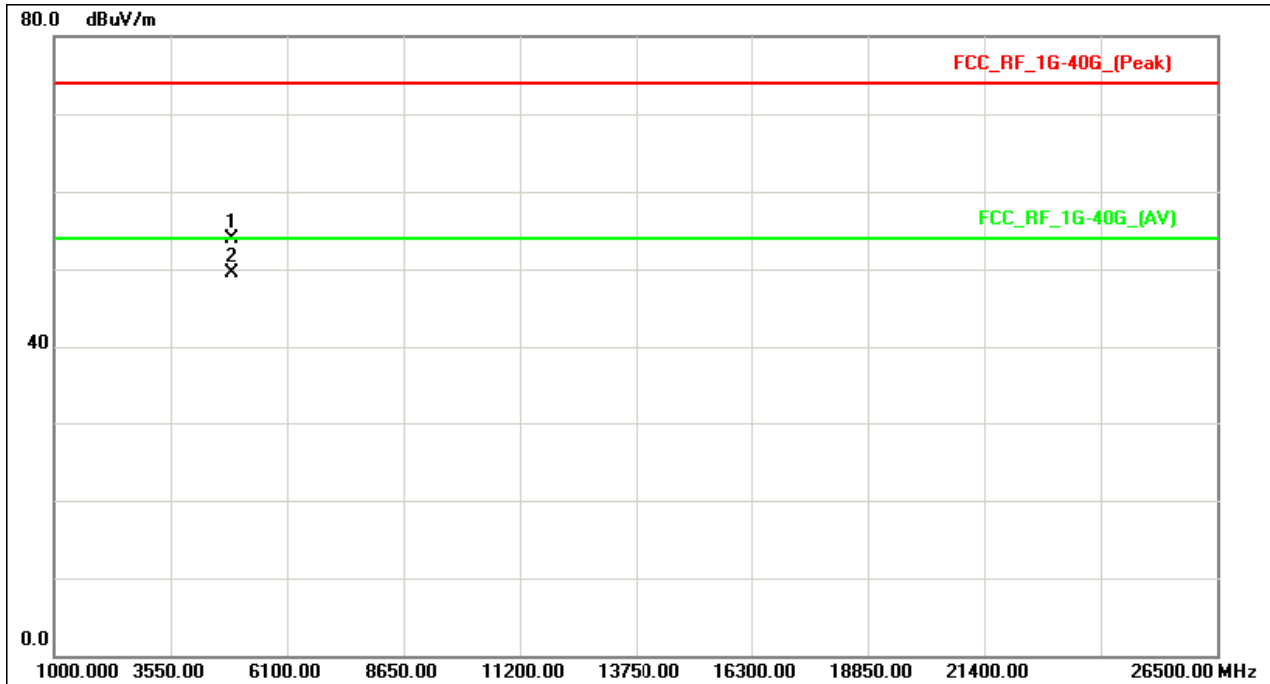
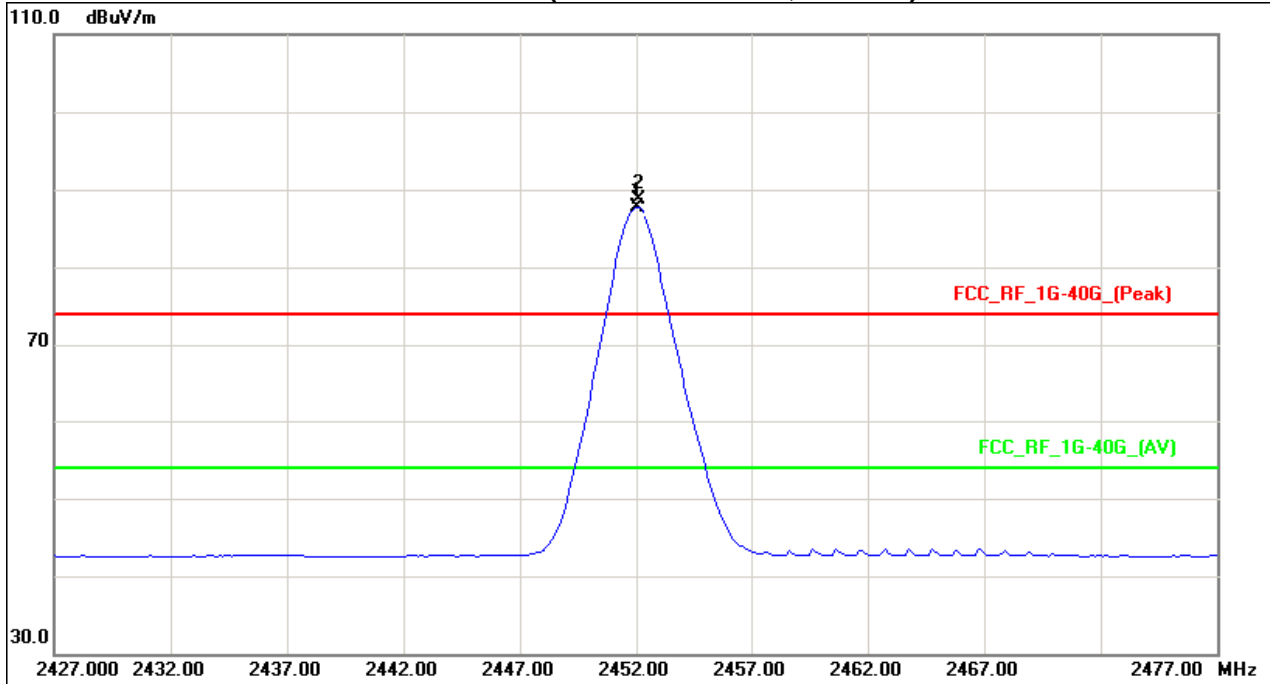
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2452.13	V	56.84	55.83	31.84	88.68	87.67	114.00	94.00	X/F
4904.05	V	48.39	44.02	5.58	53.97	49.60	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2452 MHz (Above 1000 MHz, Vertical)





EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2452MHz		

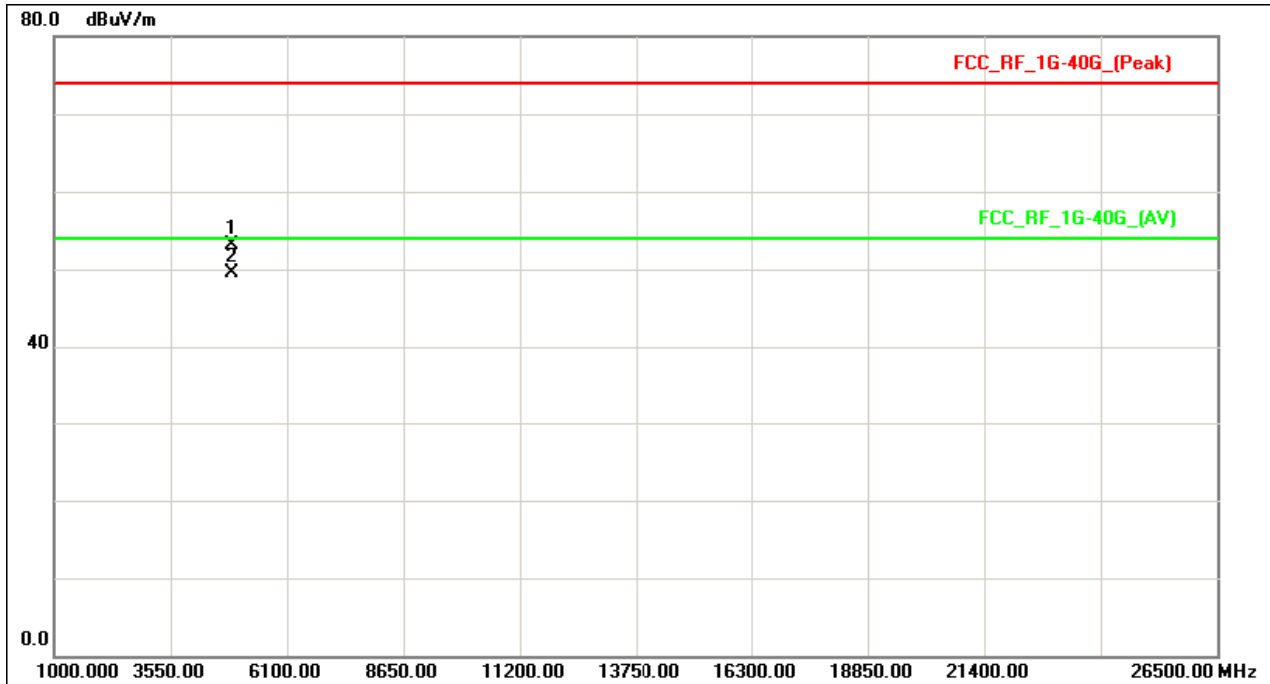
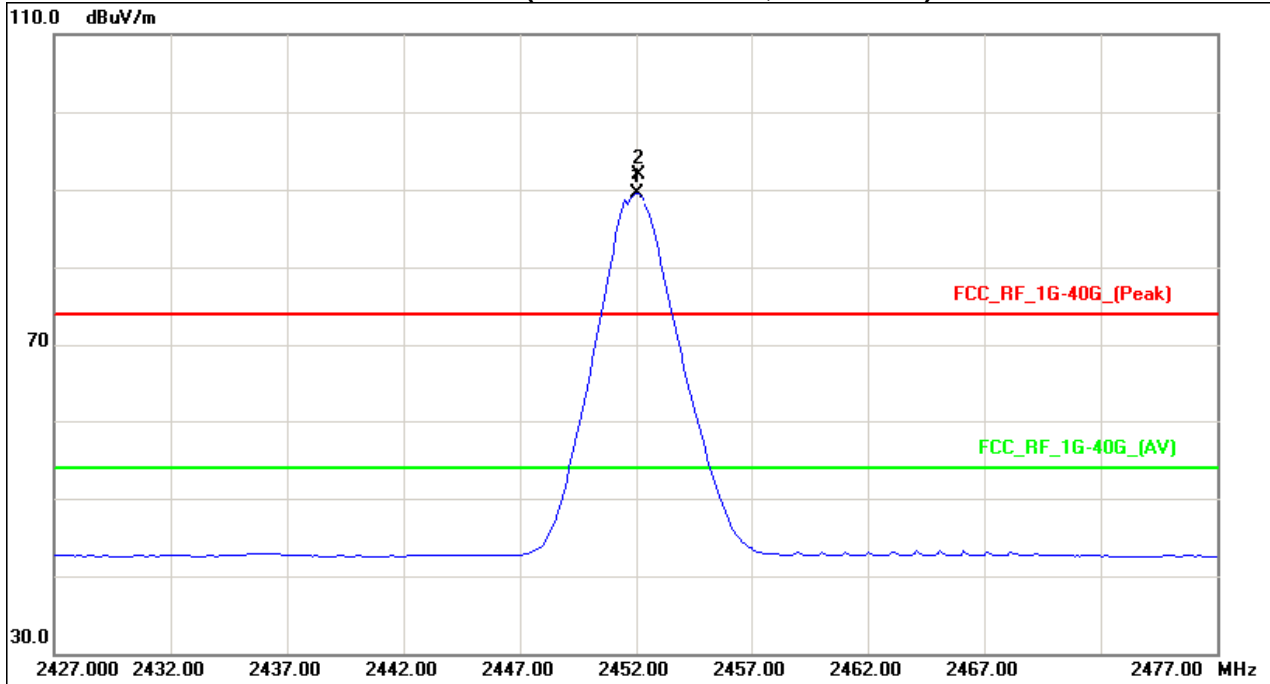
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2452.13	H	60.06	57.64	31.84	91.90	89.48	114.00	94.00	X/F
4904.05	H	47.52	43.86	5.58	53.10	49.44	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2452MHz (Above 1000 MHz, Horizontal)





EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2472MHz		

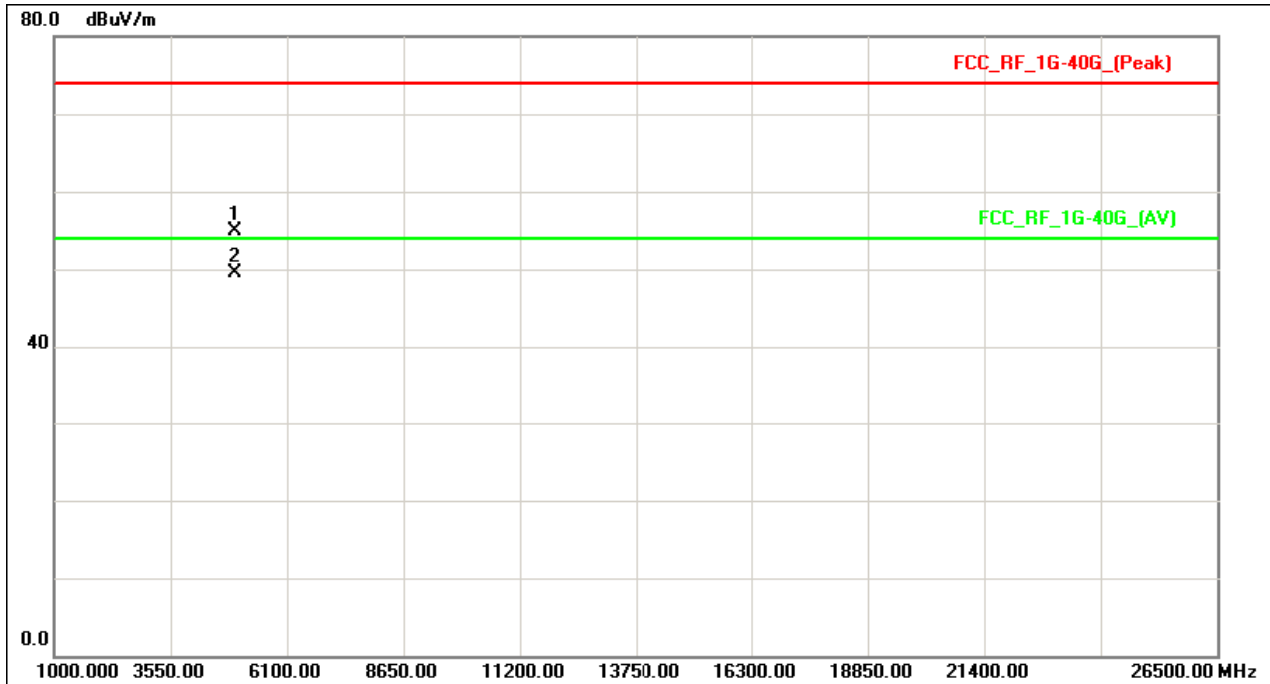
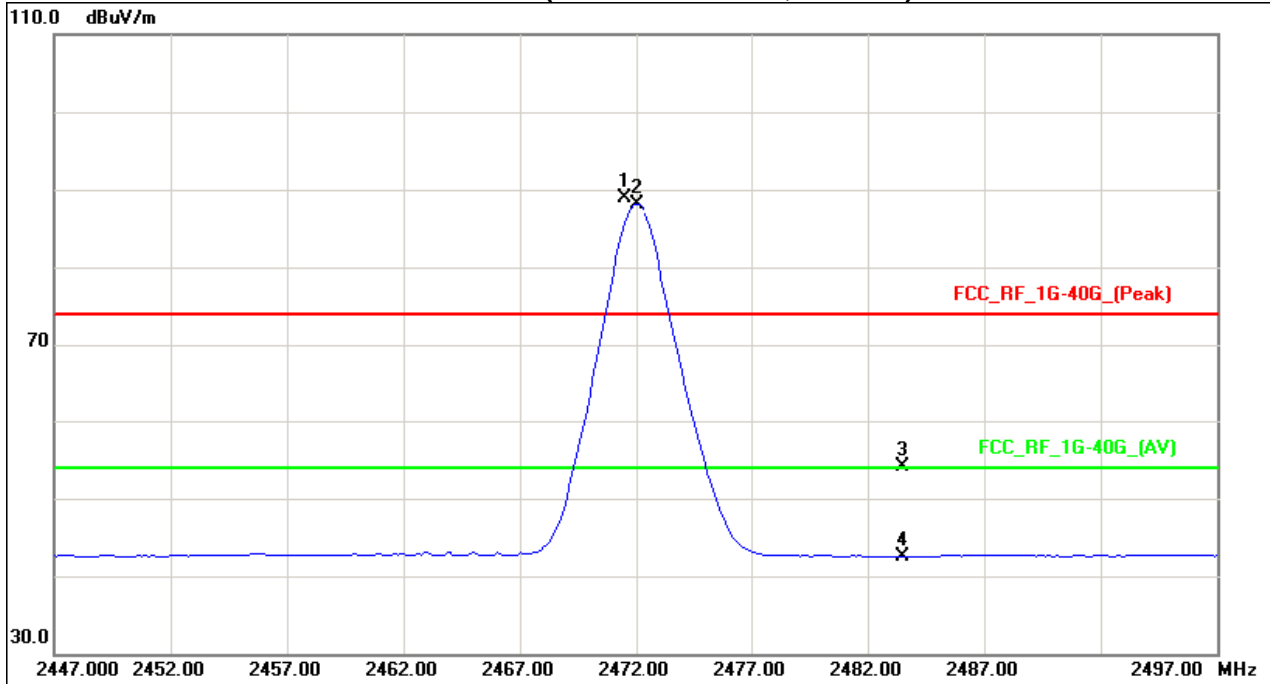
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2472.00	V	57.07	56.35	31.82	88.89	88.17	114.00	94.00	X/F
2483.50	V	22.33	10.79	31.80	54.13	42.59	74.00	54.00	X/E
4944.10	V	49.22	43.79	5.73	54.95	49.52	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦“F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ * ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
“X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2472MHz (Above 1000 MHz, Vertical)





EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX 2472MHz		

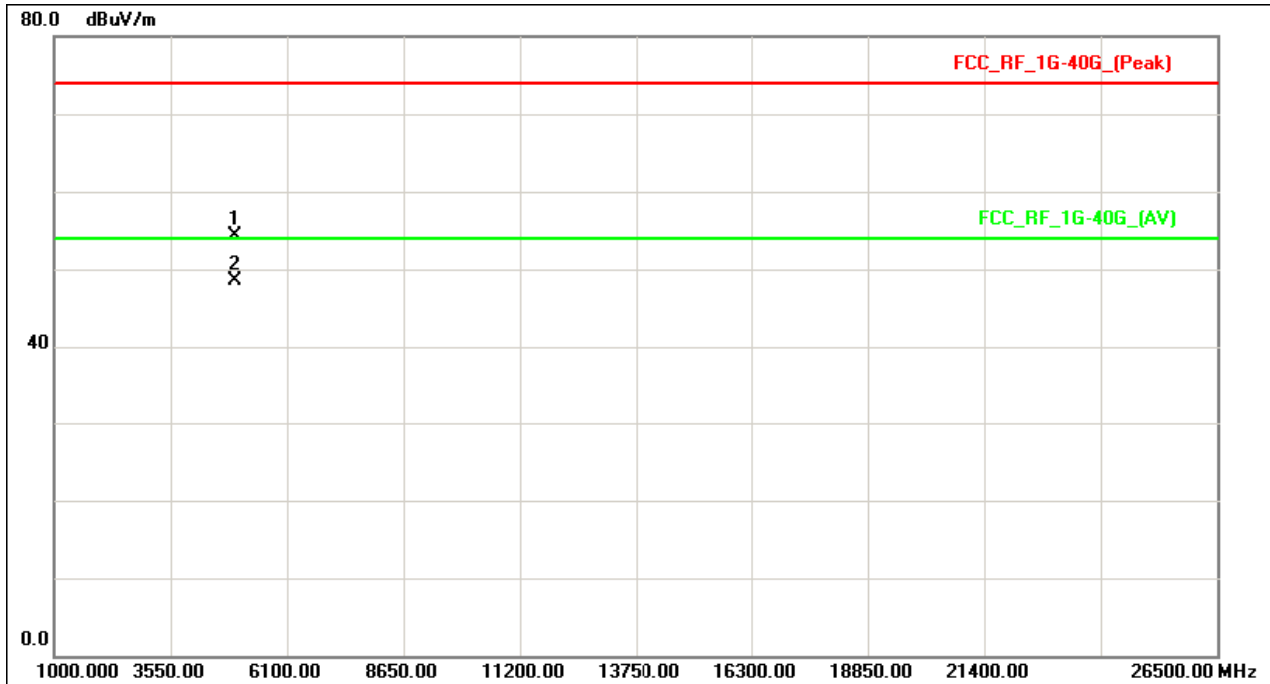
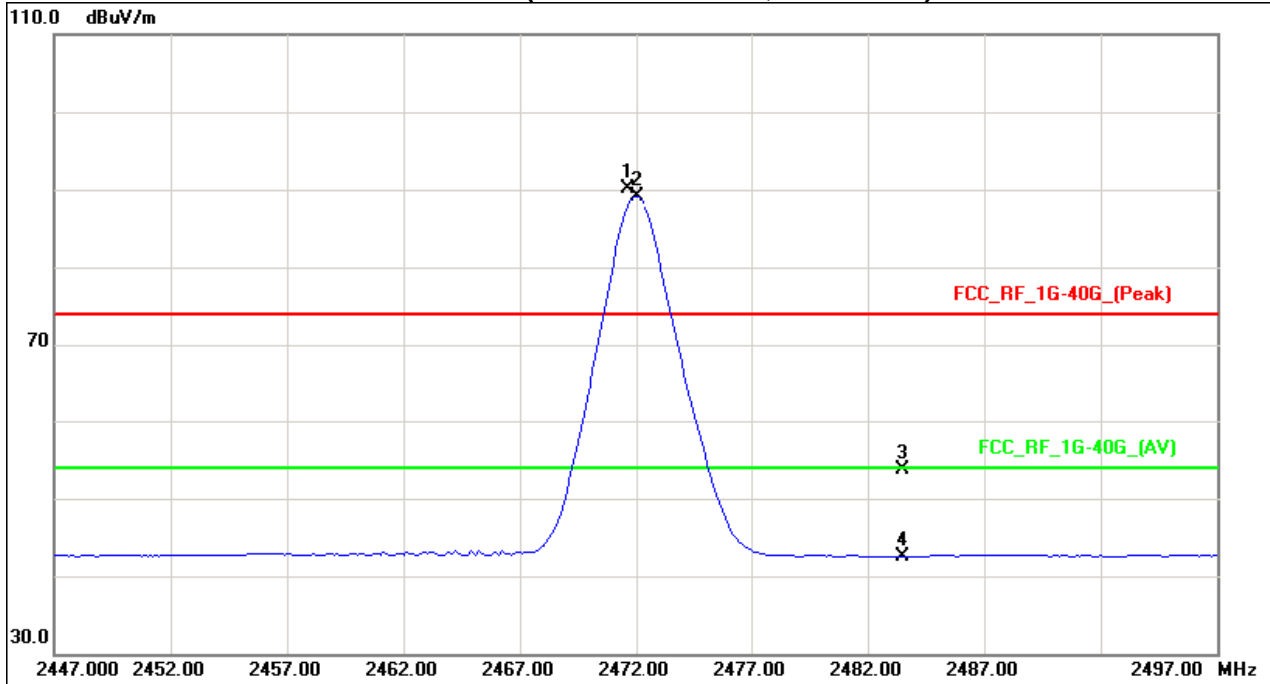
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2471.63	H	58.34	57.32	31.82	90.16	89.14	114.00	94.00	X/F
2483.50	H	21.93	10.79	31.80	53.73	42.59	74.00	54.00	X/E
4944.02	H	48.55	42.73	5.73	54.28	48.46	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X
TX 2472MHz (Above 1000 MHz, Horizontal)





4.2.9 TEST RESULTS (2400 – 2483.5 MHz)

EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	23°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX CH 2412MHz/2452MHz/2472MHz		

Freq. (MHz)	Ant.Pol. (H/V)	Peak AV		Ant./CL/ CF(dB)	Peak AV		Peak AV		NOTE
		Reading (dBuV)	Reading (dBuV)		Actual FS (dBuV/m)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Limit3m (dBuV/m)	
2412.25	V	56.79	54.78	31.89	88.68	86.67	114.00	94.00	CH01
2412.38	H	61.63	60.63	31.89	93.52	92.52	114.00	94.00	CH01
2452.13	V	56.84	55.83	31.84	88.68	87.67	114.00	94.00	CH03
2452.13	H	60.06	57.64	31.84	91.90	89.48	114.00	94.00	CH03
2471.50	V	57.07	56.35	31.82	88.89	88.17	114.00	94.00	CH05
2471.63	H	58.34	57.32	31.82	90.16	89.14	114.00	94.00	CH05

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (3) Data of measurement within this frequency range shown “ * ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) EUT Orthogonal Axis :
 “X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand



5. BANDWIDTH TEST

5.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

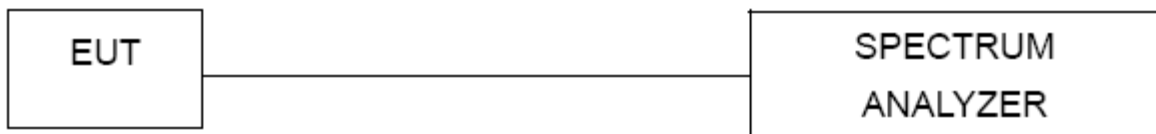
5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 20 ms.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

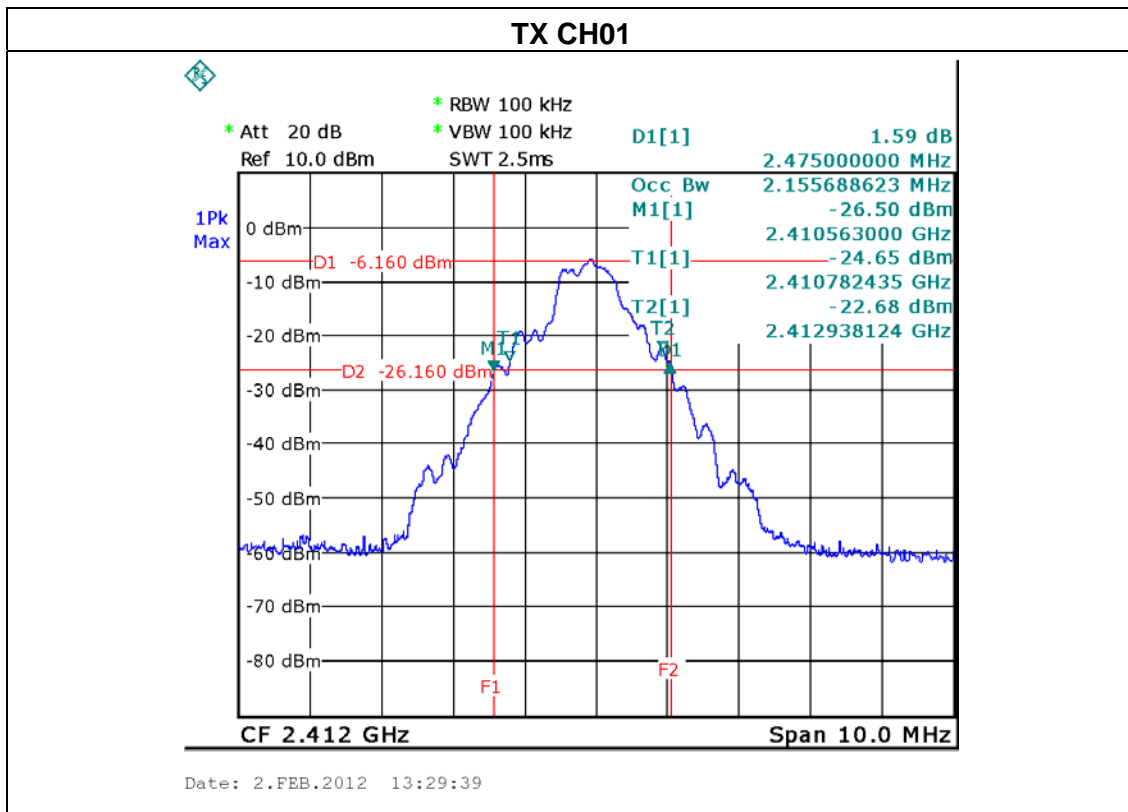
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

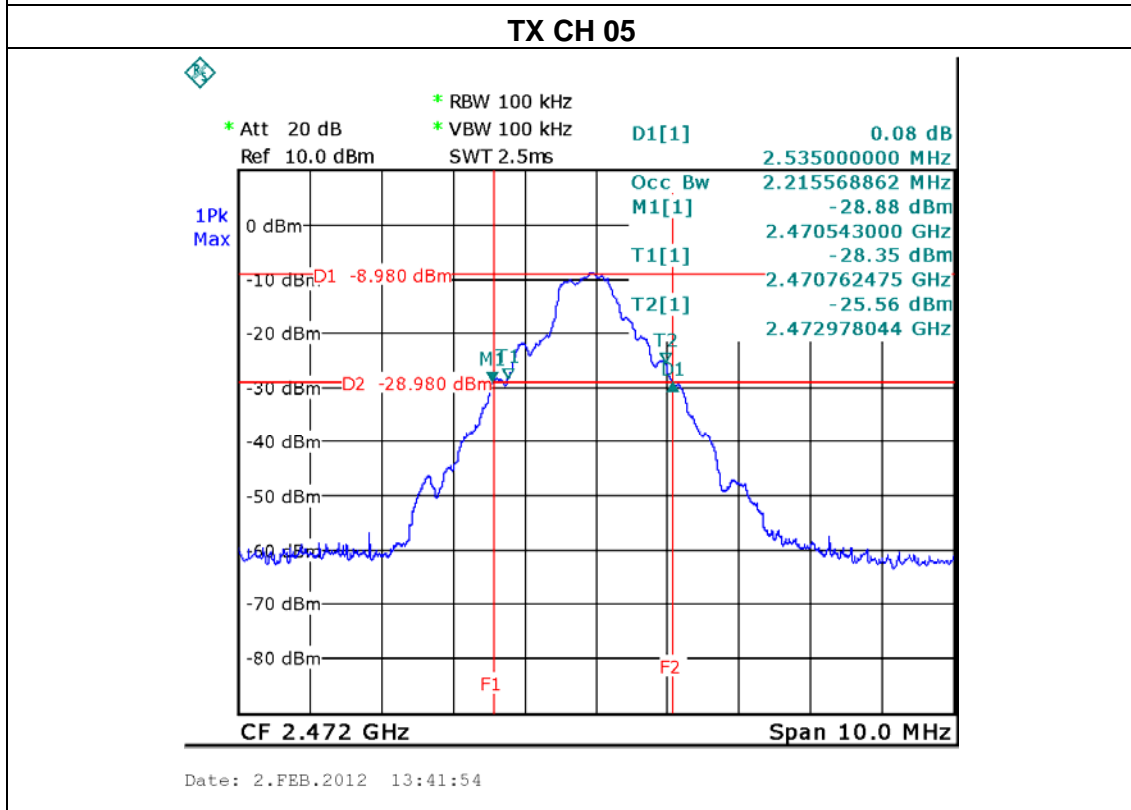
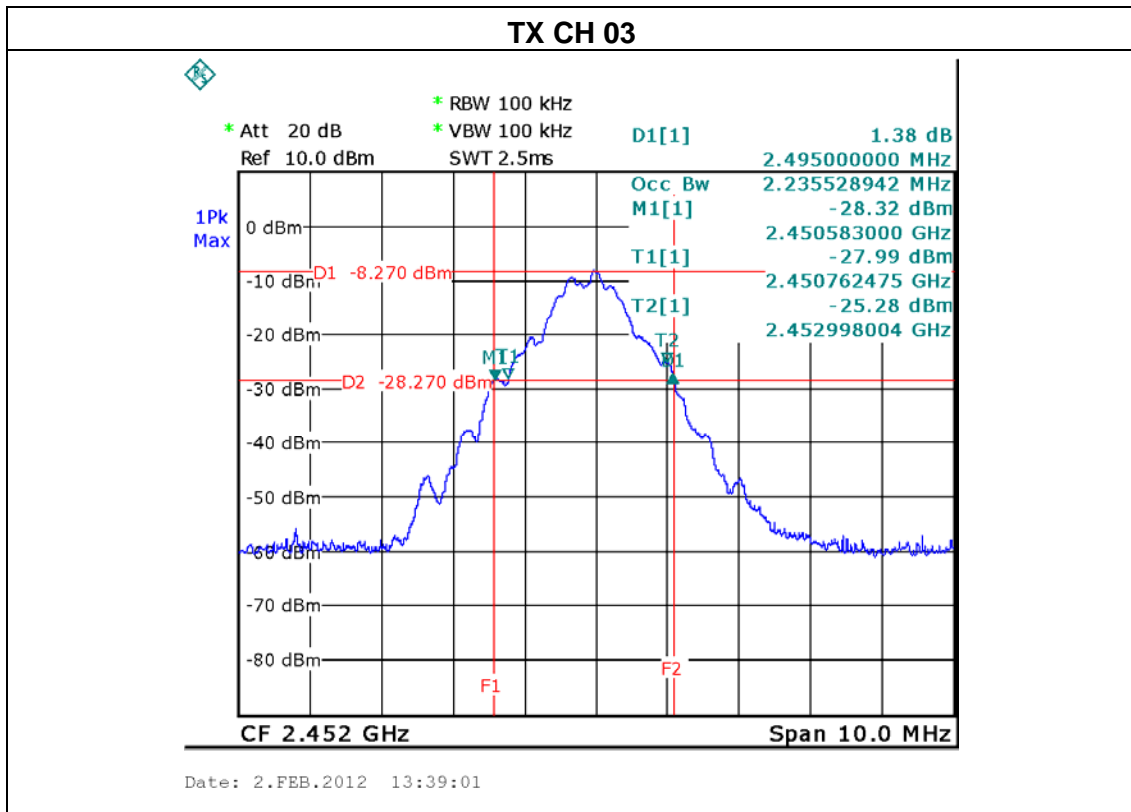


5.6 TEST RESULTS

EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	20°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX CH 01/03/05		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)
CH01	2412	2.4750
CH03	2452	2.4950
CH05	2472	2.5350







6. ANTENNA CONDUCTED SPURIOUS EMISSION

6.1 APPLIED PROCEDURES / LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

6.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2012

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

6.1.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 10 ms.

6.1.3 DEVIATION FROM STANDARD

No deviation.

6.1.4 TEST SETUP



6.1.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



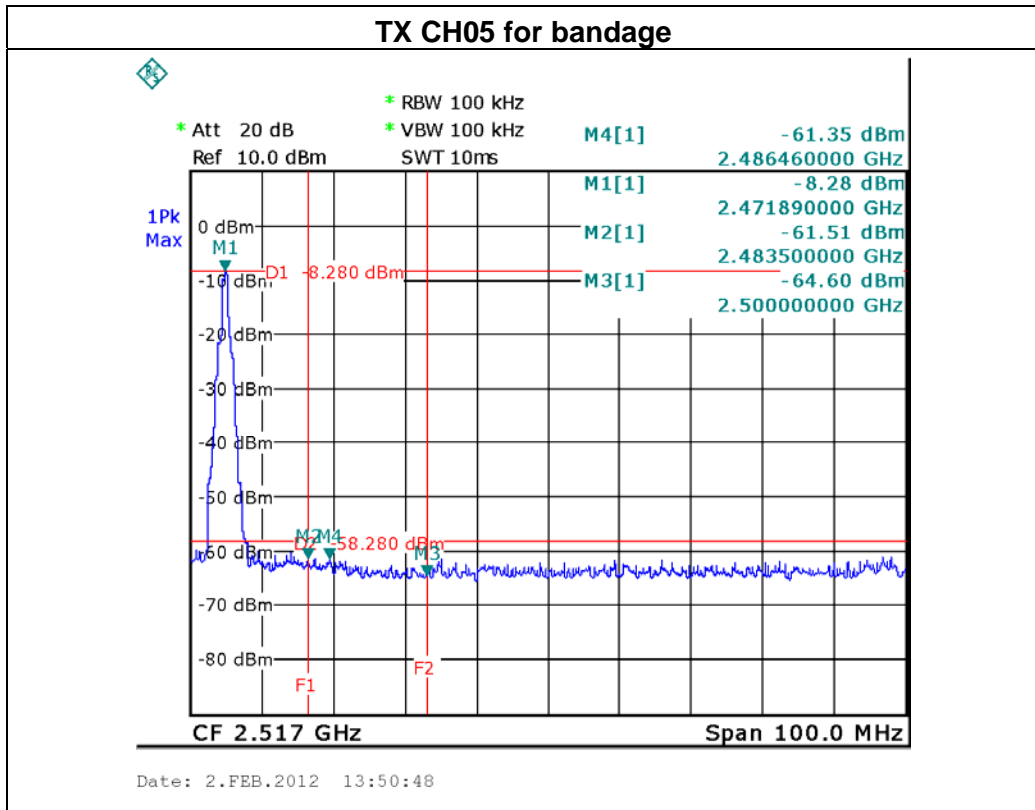
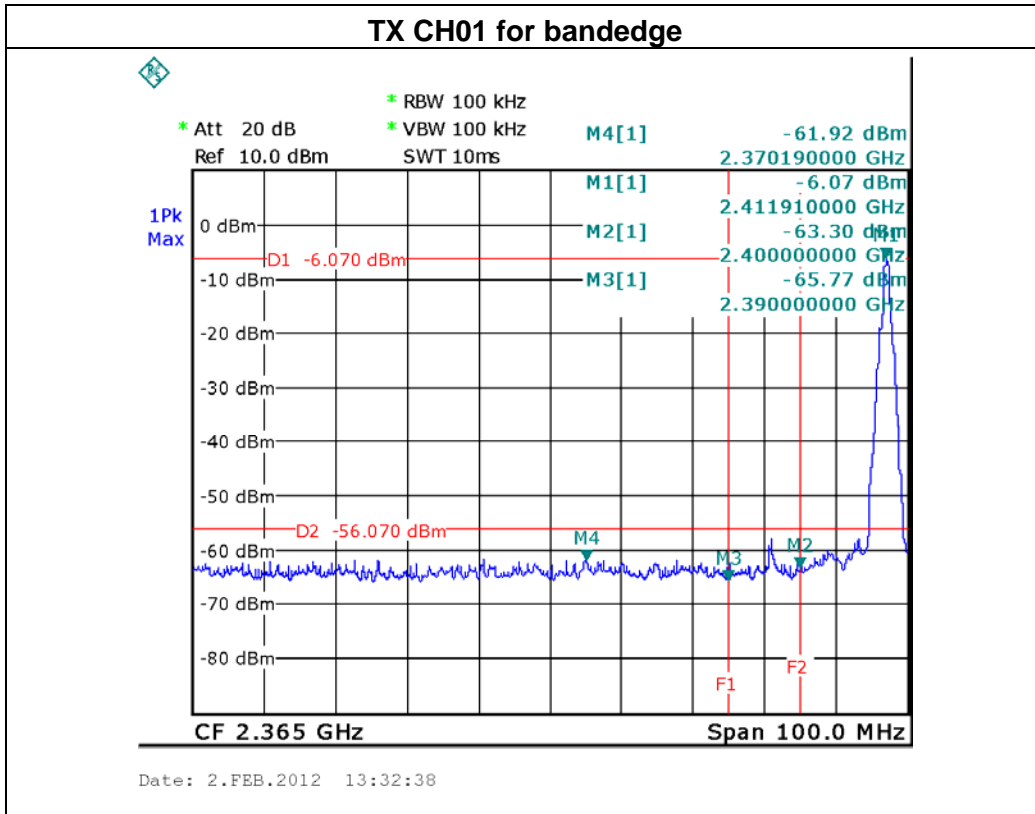
6.1.6 TEST RESULTS

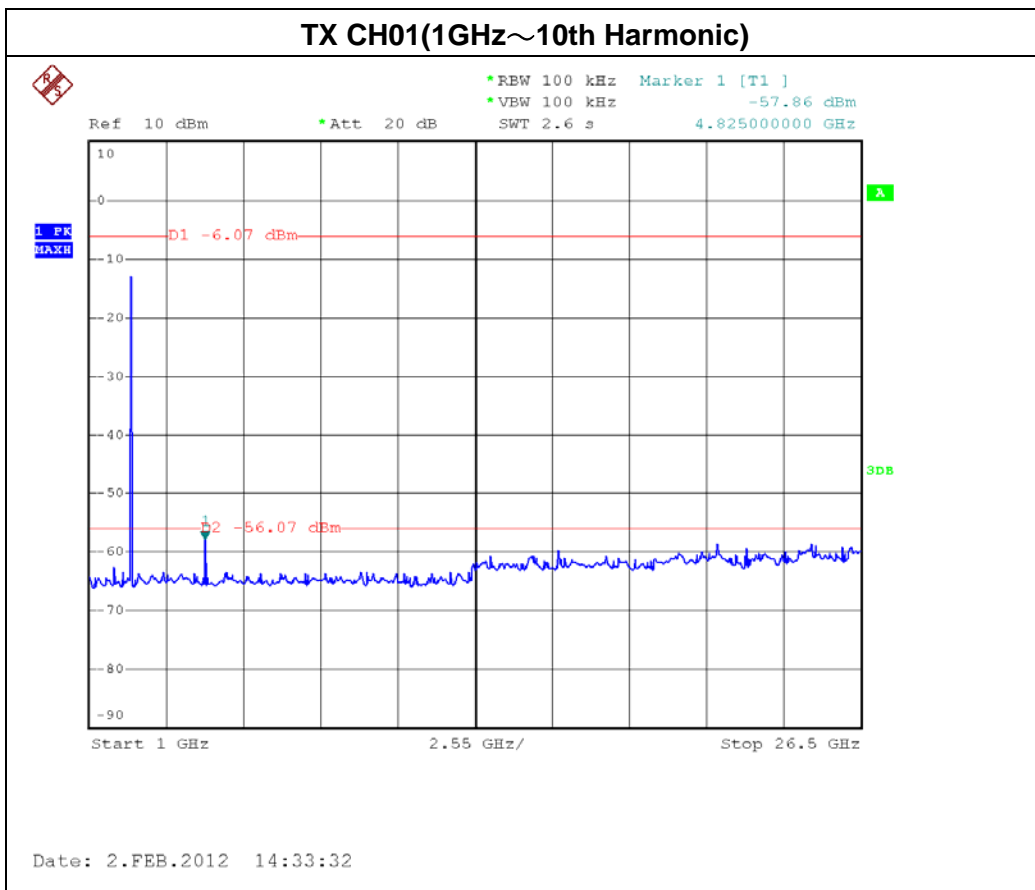
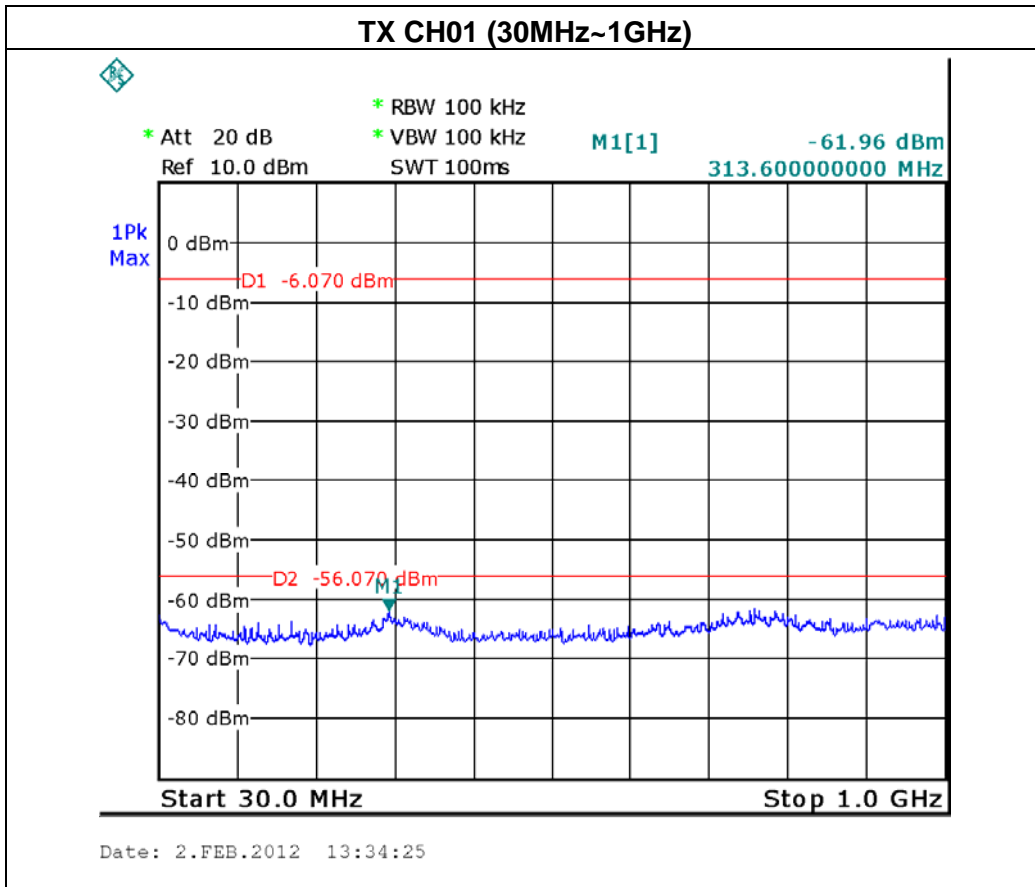
EUT :	2.4G Wireless Laser Mouse	Model Name. :	M-BM1DL
Temperature :	20°C	Relative Humidity :	55 %
Pressure :	1001 hPa	Test Power :	DC 3.7V
Test Mode :	TX CH01, CH03, CH05		

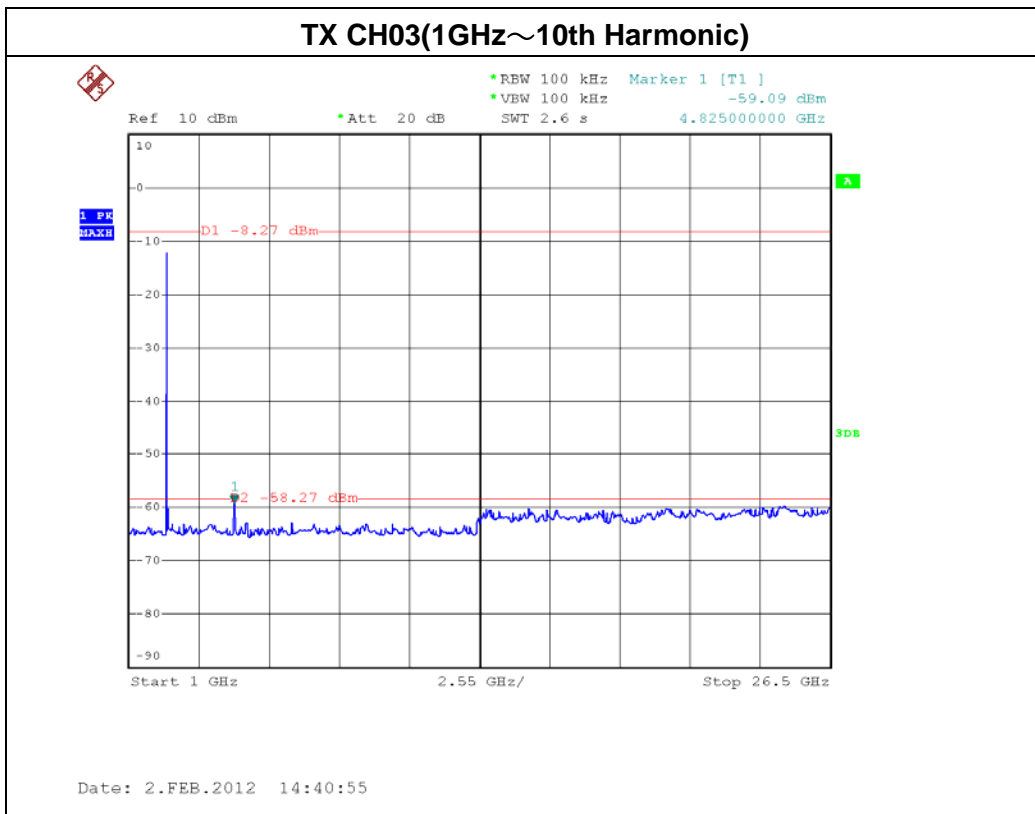
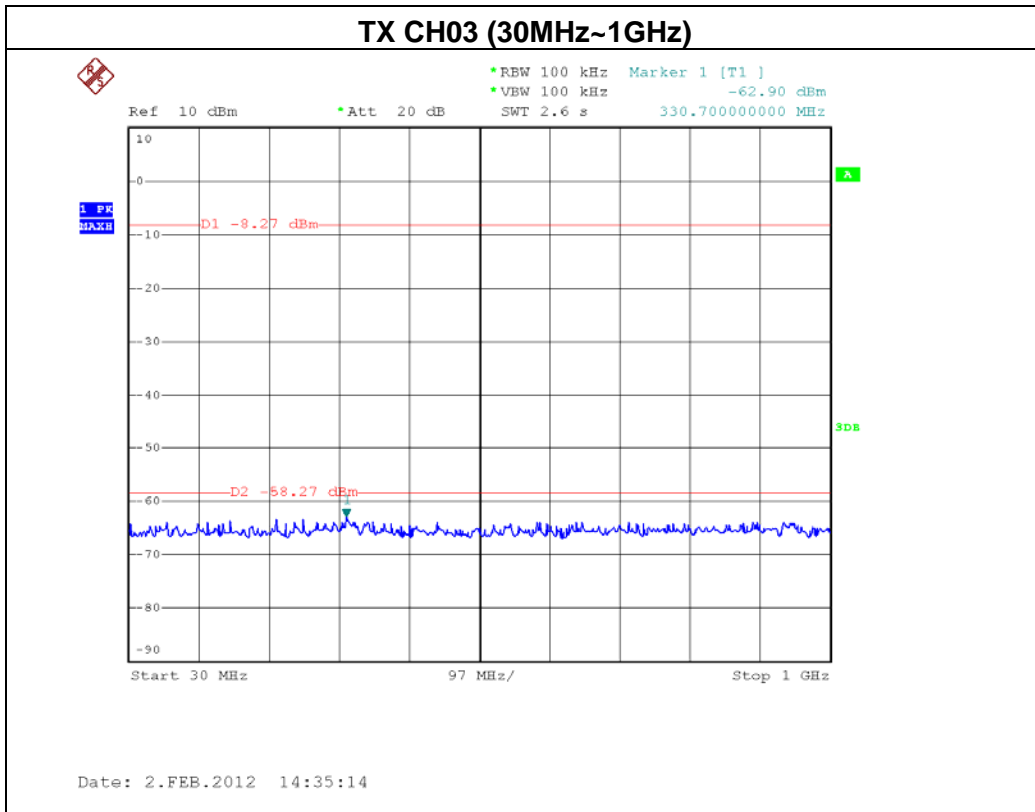
Channel of Worst Data: CH05			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2370.19	-61.92	2486.46	-61.35

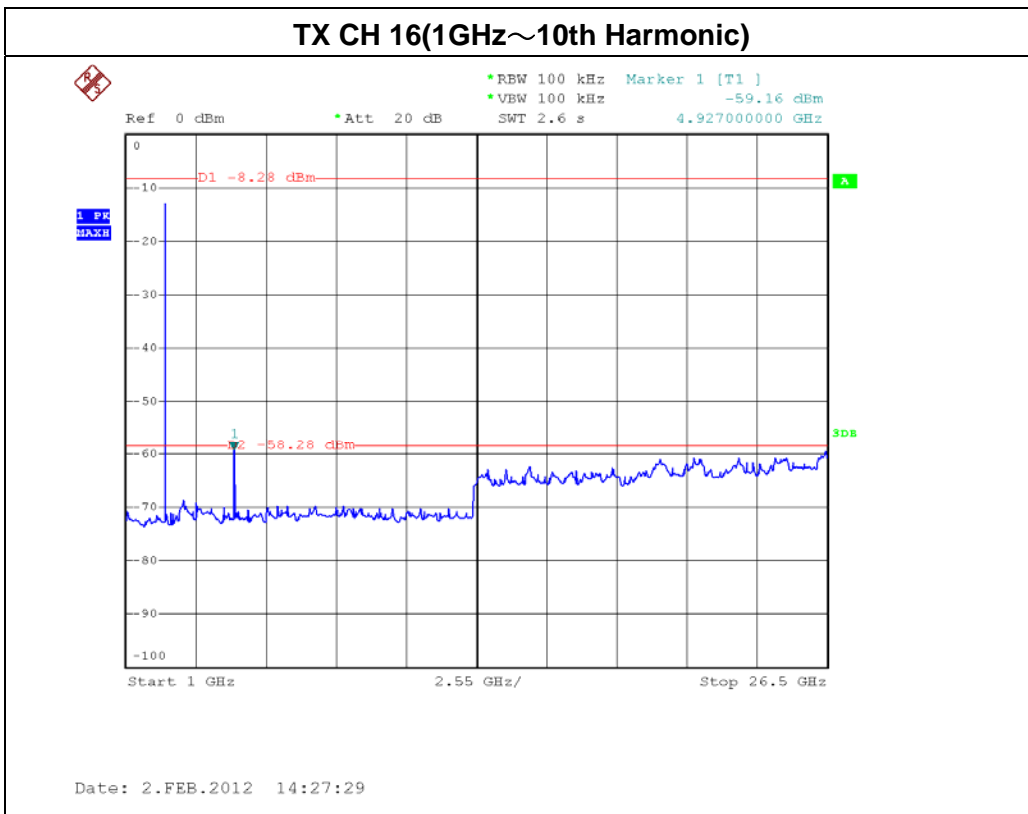
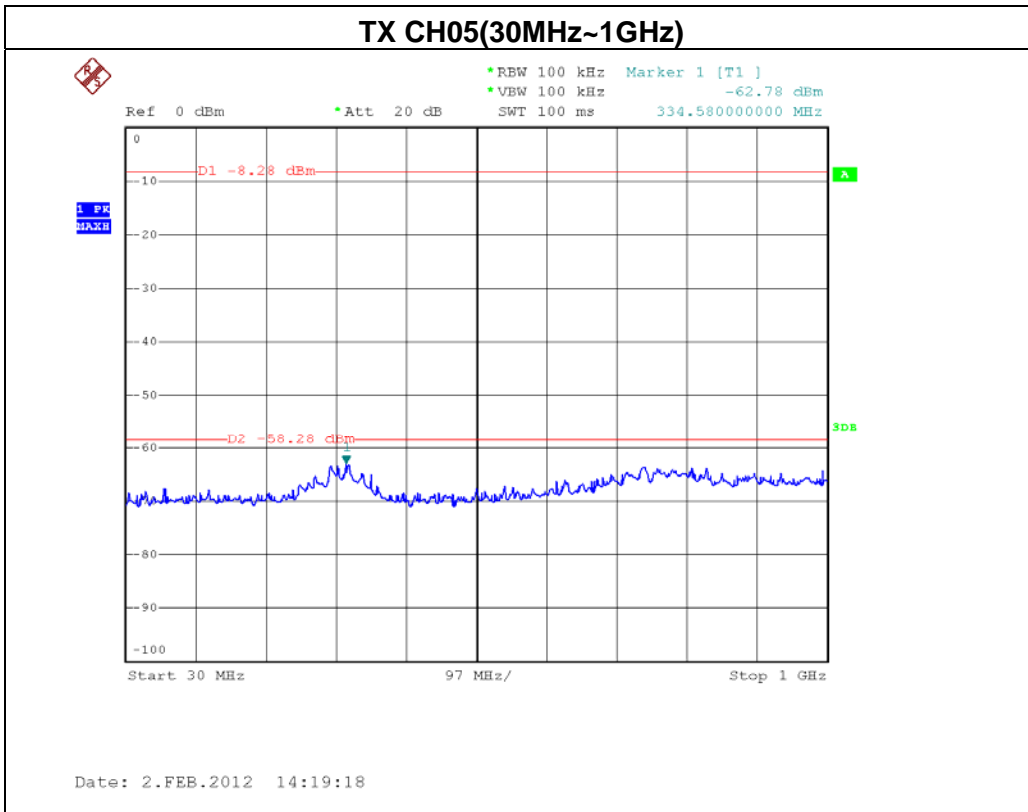
Result

In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 50dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.











7. EUT TEST PHOTO

Conducted Measurement Photos





Radiated Measurement Photos

